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THE OSPREY

AN ILLUSTRATED MONTHLY MAGAZINE of BIRDS & NATURE

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Volume VI.

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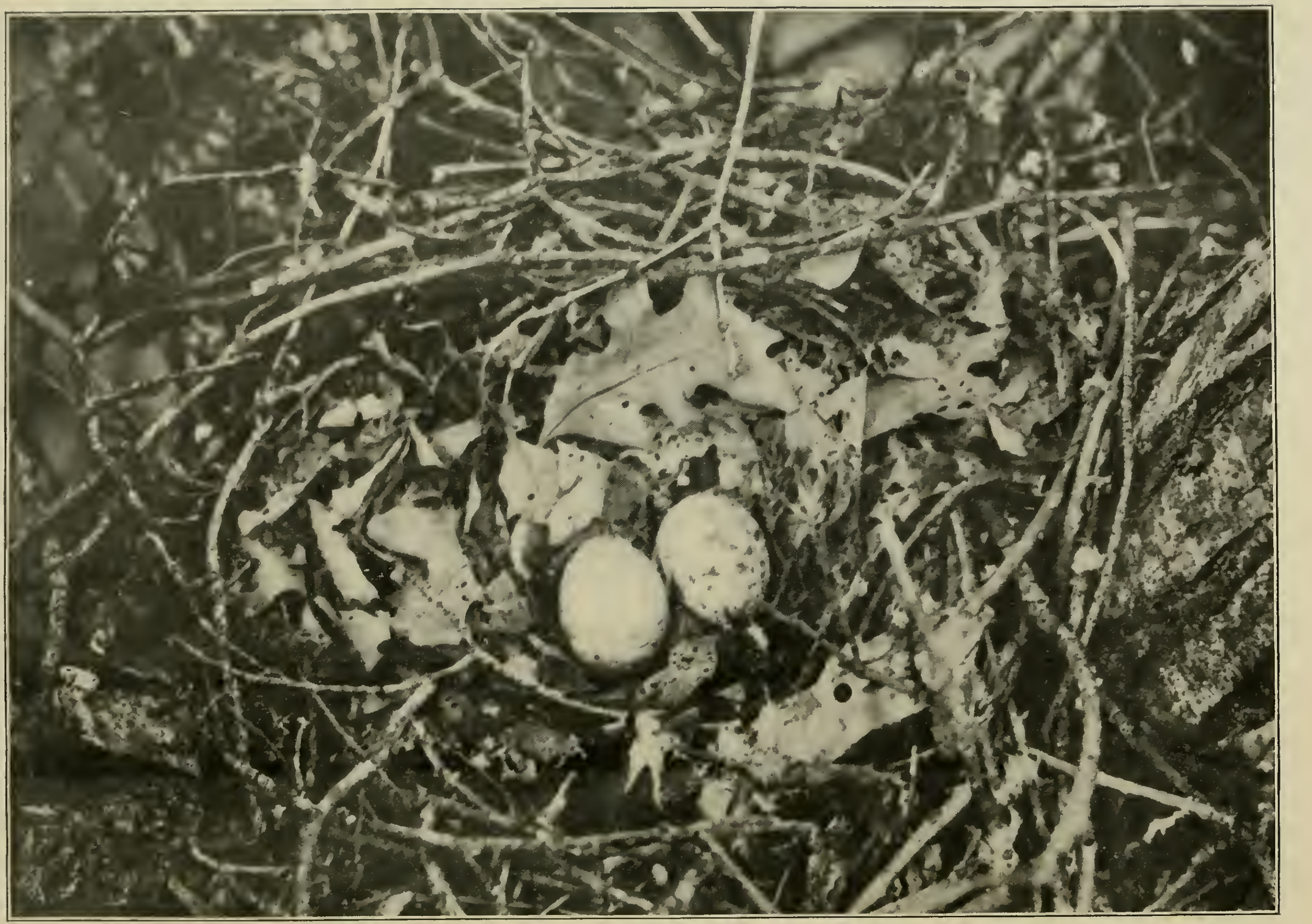

NEST OF THE BROAD-WINGED HAWK.

THE OSPREY.

An Illustrated Magazine of Popular Ornithology.

Published Monthly.

Volume I. (New Series). FEBRUARY, 1902. Number 2.

NOTES ON THE HABITS OF THE BROAD-WINGED HAWK (*BUTEO PLATYPTERUS*) IN THE VICINITY OF WASHINGTON, D. C.

By J. H. Riley.

The Broad-winged Hawk is not an uncommon breeding bird in the vicinity of Washington, selecting rather open woods, probably for the reason that heavy timber is scarce near the District. This is a departure from its usual habits in the north, I am told. It is of a rather sluggish and solitary disposition and rarely more than one pair are found in the same piece of timber, at least in the nesting season.

In the early part of April, the pair select a site for their future nest and begin in a leisurely manner to build; then the birds become very bold and I have known them to come straight towards me and to alight overhead, when all I could see of the future home were a few sticks that appeared to have become lodged in a crotch by accident. The owners of this framework for a prospective home relieved my mind of any doubt I might have had on the subject by giving their call note, which is a low whistle, sounding to me like the syllables kill-e-e-e, kill-e-e-e. This cry is never given in a hurry or in quick succession in my experience. It might with propriety be called the nest-call, as I have never heard it except in the vicinity of the nest or near a site selected for a nest. In regard to the latter statement, I will say that I have heard this cry when no nest was to be seen, but believe the site had already been selected, as on several occasions of this kind, in going back to the vicinity later in the season, I have discovered the nest, which I hardly believe I would have missed if it had been there on my former visits. Though only one bird may be present when a nest is first discovered, the other soon appears after the warning whistle has been given, showing that it was not far off.

Fresh eggs may be looked for from the first week in May until the first week in June. I believe but one brood is reared in a season, unless the first is destroyed, when another set may be laid. Two eggs are the usual complement in this vicinity, though three are sometimes found. A deciduous tree is usually chosen for the nest, though on one occasion a nest, which from the description of the bird and eggs I have every reason to believe was of this species, was pointed out to me in a small pine.

I found a nest containing two young but a day or so old, about forty feet up in a white oak, on June 3, 1896. They had evidently been fed but recently, as on dissection the remains of some small bird were found in their crops. The young hawks were rather small, a little smaller than a young chicken of the same age, and covered with a fluffy, yellowish-white down, being very pretty little objects, if it was not for their weak and altogether helpless condition.

The nest exteriorly somewhat resembles that of a well built nest of the American Crow, but is a trifle smaller and more compactly built. In my experience it is always lined with flakes of bark, generally from the White Oak, and contains a branch or so of green leaves. The leaves must be renewed every day, as they are always fresh, and I have picked up small bunches of wilted leaves from the ground under the nest that had evidently been discarded. The height of the nest above the ground ranges from thirty to fifty-four feet and it is always placed in a crotch of the main trunk. The nest is often finished and left for some little time before eggs are deposited. In building, the birds never seem to be in a hurry, and several days will elapse without apparently anything being done. A few sticks a day, at the most, seem to be the limit of their exertions, and, at this slow rate, it takes them fully three to five weeks or more to complete their domicile. A new nest is generally built every year, but sometimes they repair the old one and use it a second season, probably to save time, as they are such slow builders.

As this is primarily a hawk of the woods, being rarely found far away from their shelter, it does little or no harm to poultry and but little to birds, except in the breeding season when it has young to feed, when it occasionally catches some of the smaller birds. It merits all the protection that can be given it on account of the good it does in catching mice, insects and crayfish.

The accompanying photograph was made by my friend, Mr. Paul Bartsch, of a set taken by me June 4, 1901. It was situated in the crotch of a chesnut tree, fifty-four feet from the ground. The nest contained the regular bark lining and bunch of green leaves, the latter showing up very well in the picture. Incubation was nearly complete, but I was able to save the set after considerable time. This nest was found when only one or two sticks had been placed in the crotch, as mentioned above.

Below I give a list of the remaining sets taken by me, which, though not large, is considerable in view of the fact that no special effort has been made to collect a series of these eggs and their discovery has been by accident as it were, though I will admit that whenever I have heard the alarm note of this bird I have generally made a successful search for its nest.

1. Set of two fresh eggs taken May 6, 1893. Nest in tulip poplar, about forty feet from the ground; made of sticks lined with flakes of bark and green leaves.

2. Set of one fresh egg taken May 11, 1895, from the same nest as set No, 1.

3. Set of one egg, showing traces of blood, taken May 15, 1897. Nest situated in the three-pronged fork of a white oak, about forty feet from the ground. It was composed of sticks, lined with green leaves, and was about 15 inches in diameter with the rather shallow egg cavity about 8 inches. I took two young from this nest in 1896.

4. Set of three fresh eggs taken May 3, 1899. Nest in a maple, about thirty feet from the ground, composed of moderate-sized sticks, lined with pine, oak and maple bark, with a few green leaves. The nest was rather small, about 15 inches in outside diameter, with the egg cavity about 8 inches. The character of the country around the nest was rather open timber, composed of hardwood and pine. The parent hawk, contrary to custom, slid off the nest when I was about half way up and left without raising any outcry.

5. Set of two nearly incubated eggs taken May 20, 1901. The nest was in the crotch of a rather small chestnut, about 35 feet from the ground. It was a rather large nest for this species, composed of medium-sized sticks, lined with flakes of bark and green leaves. From the ground it resembled the nest of the Common Crow very much. I found the nest the Sunday before by hearing the nest-call and then looking for the cause of it. Both the male and female were present or rather appeared on the scene soon after I took the eggs. They sat motionless a short distance off and gave their mournful call at intervals, but aside from this they made no demonstration against the robbery of their home.

All of the above sets are now in the U. S. National Museum.

RAMBLES ABOUT MY OLD HOME.

By Milton S. Ray.

When the memories of by-gone days come flitting back from the fast receding past, one feels an irresistible longing for the scenes of his childhood. In this respect I am fortunate, for I have but to board a train at my door and after being whisked through a rather uninteresting stretch of country for 18 miles, find myself at San Mateo, and, after half an hour's walk, I am at my old home. As the train approaches San Mateo, the barren hills on the west gradually become wooded, and when the town is reached, they loom up heavily timbered, and further back, rising in majestic grandeur is "Montara", the highest peak of the rugged Sierra Moreno mountains, on whose rocky sides the tall redwoods are easily visible. On returning from the Orient, this peak and Mt. Tamalpais, in Marin county, are the first land that is seen, at first resembling small islands but gradually merging with the mainland. The Farallones, 30 miles out, appear like small rocks near the coast, from a distance, and are not seen until an hour or so later.

The place where I first made my acquaintance with the Californian avifauna seems about the same as it did a dozen years ago, with the exception of the salt marsh bordering San Francisco Bay. I visited the marsh recently but what a change had progress reaped! Where waterfowl once sported along the reedy sloughs and clumsy rail took flight, where Marsh Sparrows sang and nested in the low bushes along the levees, and myriads of crabs retreated from the incoming tide along the muddy banks, is now a promising field of waving grain soon to feel the keen edge of the mower. Meadow-larks now hold the post of song-laureate to the district and their tuneful pipe is heard on every hand. The old boathouse stands beside a long since dried and cracked up slough with the nearest water about a mile distant. Now one hears the squeaking of a windmill where once echoed the sharp report of a gun and the hasty departure of the more fortunate members of a flock of ducks.

As late as 1889, I remember sportsmen returning with as many as 200 Clapper Rails while now one would find it exceedingly hard to bag a dozen, although one obesrver* in another locality finds them as plentiful as ever. If no law is passed for their protection and the reclamation of marsh land continues, I predict the extinction of *Rallus obsoletus* in the near future.

We return to the farm; the House Finches are as noisy as ever and the loud chirp of a female betokens the nearness of a nest, which a child could spy, as we entered the gate. I noticed the feathered tenants have assembled in their usual numbers excepting a marked scarcity of the Willow, Arkansas and Lawrence's Goldfinches so numerous in former days.

One must leave the ranch before Old Sol has made his presence felt, to do justice to the beauties of Casey's Canõn. The birds are up and greet us from all sides as we plod along with the "ornithologist's burden." One road turns to another, one lane to a bypath, and at last we approach the ravine. If I mistake not, our way leads us through a field where we will have to tread gingerly, for Casey is wont to have a herd of "green" steers who, perchance, may seek to take offense at our modest retinue. Not to prevent the smooth passage of this article, I eliminate any manoeuvers we make in order to elude these forward creatures. Finally we reach a rough wooden bridge and before us a thick maze of oaks, laurel, madrone and manzanita, the trees of a foothill forest. Below, tumbling over its rocky bed and fringed along its mossy banks with slender ferns and bright flowers, is the clearest little brook in the country, while all about us are the various birds of a California woodland, the hammering Flicker, the keen-eyed Sparrow Hawk, the blinking Burrowing Owl, the elegant California Partridge, the mournful Dove, the somber California Towhee, the quiet Titmouse, the tiny Bush-tit—I stop for want of space.

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*Adams—Condor, Vol. II, p. 31.

May 1, 1898, was a very profitable day, oologically considered. Scarcely had I left the above bridge when I perceived a nest of the Meadowlark (*Sturnella magna neglecta*), among the grass on the hillside, containing five very finely dotted eggs; a few rods, and the mossy nest of a California Jay (*Aphelocoma californica*) in an oak yielded the same complement. Half a mile further and the loud cries of a pair of Western Red-tails, (*Buteo borealis calurus*) hovering over the canõn, indicative of a nest claimed my attention. Some time elapsed before I located it in an almost limbless oak on the hilltop, 50 feet above the ground, and when I clambered up and peered over the brim of the huge stick-nest, I saw three lightly marked, well incubated eggs to reward my efforts. A ready tape showed it to be 34 inches across, while the cavity was 17 by 5 inches. A nearby oak-stump donated seven eggs of the Red-shafted Flicker (*Colaptes cafer*) and, as I was about to climb the dilapidated fence which separates Casey's land from his neighbor's, I met one of those great, strange birds, the Horned Owl on her nest in an oak. She rose and disappeared, disclosing one almost full-fledged juvenile and an addled egg. On my return, finding this young one on the ground, I decided to carry him to the city. His owl-ship thrived well on raw meat and he became quite tame, but, being compelled to leave him, by an unavoidable absence from town, I entrusted him to a friend and—sufficient said?

We trudged over one range of hills and down another and on until there lay below us, deep and still, placid Lake San Andreas, an artificial body of water which supplies San Francisco. The water is by no means clear and would scarcely tempt even a thirsty person. This lake marks the boundary of foothill and mountains. Sturdy oaks grace the grassy slopes on one side while opposite rise the monarchs of all forests, the redwoods, in whose dark depths dwell that select society of birds, shy of approach and difficult of acquaintance. If you would know them do not rudely crash through the brush or, in a noisy cart, follow the roads, but seek some small timber-bound woodland lake or watering place, there linger but not intrude; soon the merry Point Pinos Junco a brilliant combination of brown and white, the Crested Jay, the showy mountain Partridge and others will come to partake of a natural sparkling vintage. You will see nature as the masses seldom see it, and one of a sentimental turn of mind is almost prone, then, and there, to erect a rude cabin of logs in this ancient forest and end his days in a study which yields no disappointment.

I may add, my brother William R. Ray took a set of four eggs of the Point Pinos Junco (*Junco hyemalis pinosus*) near King Mountain in San Mateo County on May 12, 1901, the nest was made of grasses and stems on the ground, flush with surface; partially hidden by a small bush among the ferns and flowers. The eggs are greenish-white, finely dotted with reddish-brown and lavender, and heavily blotched in a wreath around the larger end; Size .79 x 57, .75 x 58, 72 x .58, .72 x .58. All the Juncos of this locality in the breeding season are now said to be of this variety.

THE MOCKING BIRD AT HOME.

By F. H. Knowlton, Ph. D.

Although I have traveled quite extensively throughout this country, it has not been my fortune to see very much of the Mocking bird. I have seen an occasional example on the islands near the mouth of the Potomac and along Crow Creek, a small stream in northeastern Colorado. At the latter locality they were in considerable abundance, but as it was near the close of the breeding season, they were more interested in caring for their young than in giving examples of their musical attainments. It was, therefore, with a great deal of pleasure that I found myself, during the past season, in a locality which afforded them in great abundance and seemingly in the fullest possible song.

I spent the latter half of June along the San Juan river in southwestern Colorado and northeastern New Mexico, especially in the vicinity of Farmington, N. M. The surrounding country, except in the immediate vicinity of the streams, was originally very barren and desolate, the conspicuous vegetation consisting mainly of sage bushes, an occasional juniper, and a fringe of cottonwoods and willows along the water courses. The cottonwoods, by the way, were the largest and finest specimens I have seen, not infrequently being 4 or 5 feet in diameter and 60 to 75 feet in height. Some twenty years ago a number of settlements were started along the San Juan, the barren soil reclaimed by irrigation, and at the present time they support a succession of splendid fruit orchards. Apples, peaches, plums, cherries, pears, apricots and all small fruits are grown to perfection.

Whether or not the advent of man has caused an increase in the numbers of Mocking birds, I was not able to ascertain, but certain it is that they are very abundant at present; more abundant, in fact, than I remember to have seen robins at any particular locality in the east, during the breeding season.

The Mocking birds, apparently, are not persecuted by the people, and I did not see a single caged bird. They were found in the orchards and especially in the underbrush along the river. They were nest building at the time of our visit, and I spent some hours in watching a pair at work in a tree under which we had our camp. This tree, a cottonwood, had a large number of small branches growing out of the trunk near the ground, and in the angle formed by a thick bunch of branches and the trunk the nest was placed. It was only about seven feet from the ground and the birds were very industrious in building the foundation, which consisted entirely of small twigs. They were perfectly fearless and continued work with several persons within fifteen or twenty feet of them, and on one occasion one of the birds came to within three feet of me for a particular twig that had attracted her attention.

These birds were early risers and we were awakened at the first peep of day by a chorus of a dozen or more in the low trees about our camp; and they sang continuously until dusk, even in the hottest part of the day. I am not enough of a musician to venture an attempt to reduce the song to a written scale, nor enough of a linguistic acrobat to attempt portraying it by a jumble of variously accented syllables, and will only say that it was the sweetest and most varied bird song I have ever listened to.

REMINISCENT AND RANDOM MAINE BIRD NOTES.

By W. C. Kendall, Ass't U. S. Fish Commission.

"Why does the Rooster crow, papa,
Why does the Rooster crow?
The reason why I'll tell to you:
Because the Rooster cannot mew,
And so he has to crow."—*Father Goose.*

Why does the male Grouse drum?

Bendire says that "while this drumming cannot be considered a love note, as it may be heard almost every month in the year, and sometimes in the night as well as in the daytime, yet it must have some attraction for the females and I think is performed as a sign of bodily vigor and to notify her of his whereabouts." In another place, quoting from Manly Hardy, "I consider that the drumming is not a call to the female, as they drum nearly or quite as much in the fall as in the spring, and I have heard them during every month in the year."

The first statement implies that the drumming is essentially a "love call."

Mr. Hardy's observations were undoubtedly correct; but the fact that the birds drum quite as much in the fall as in the spring does not detract from the love call argument.

Is not the clarion of the chanticleer as much a love note as the warbling of the Bobolink, though it answers also another purpose of a challenge to a rival knight of the barnyard?

The nuptial rites of these fowl are not restricted to the time when "a livelier iris changes on the burnished dove." Most of us are familiar with the behavior of a hen for sometime deprived of male society, and have observed that those demonstrations do not occur just before the hen begins to "set." In fact it is more likely to occur in the fall than in the spring. Perhaps domestic fowl are not parallel examples, their habits having been more or less radically modified since the wild state. Yet the fact remains, unless I be mistaken, that copulation does not immediately precede incubation.

It was in October, I think, at any rate in the fall of the year, that I once observed a male Grouse treading a hen. That this function is, at least to some extent, performed in the fall, is evidence in favor of the drumming being a "love note," if not wholly, at least, partly so. Even if it be at any time a challenge to other males, is it not even then indirectly of the same import?

Ruffed Grouse are *feræ naturæ*, yet, tradition to the contrary notwithstanding, they are easily tamed and in the more unsettled and undisturbed regions are tame and unsuspecting. For some reason they seem partial to the neighborhood of settlements and even in the backwoods frequent clearings and the vicinity of old logging camps.

A barber in Brunswick, Maine, once had two Grouse that had been caught, having from fright flown into some buildings. They were adult birds and became as tame as any domestic fowl. They would permit him to fondle them and would feed from his hands.

The Grouse hunter does not have to go far from any of the large cities in Maine to find more or less of these birds notwithstanding their constant persecution.

In a little patch of woods not over a fourth of a mile from the heart of the village of Freeport, twenty years ago and more, every fall I could find a small covey of "Partridges." Last November, I visited this place and found five birds, but they were very much wilder than the birds of the old days.

Regarding the food of the Ruffed Grouse: in reading the *menu* as presented in Bendire's excellent work, I found no reference to apples. Old orchards near the woods and lone apple trees in the woods are not uncommon in the old settled portions of southwestern Maine. In late fall Grouse are always sought for in these places by gunners, for if there are any of these birds in the vicinity they are pretty sure to be found under the apple trees just before dusk. They feed upon the apples especially if they have been frost bitten and afterwards thawed; besides, clover and other plants, also used as food, remain green longer under the trees. After a deep fall of snow, and sometimes even before snow, Grouse resort to birch and apple trees to feed upon the buds. In March, I once counted twenty birds in the apple trees close behind our house where they appeared every evening for several weeks. These birds were unmolested, and though the trees were young I think they were not seriously injured.

There are laws, rigid laws, in Maine for the protection of birds. It is next to impossible to carry birds from that state, thanks to the Lacy act. Only two partridges (Ruffed Grouse) can be taken legally—taken, not sent. Fifty cents will allow you to send a pair; but no more. And fifteen are all that any one can have in possession at any one time or one day. Well, that is "enough for a mess." This is intended to protect the Ruffed Grouse.

The huntsman with his gun and dog is the birds' enemy, but there are others. In a two months trip in northern Maine, last fall, I noted no less than twenty places where these birds had been killed by some animal. The marks near by some of them indicated skunks. I also saw many places where Thrushes had been killed by animals, presumably skunks, though minks, martens or foxes may have been the culprits.

Foxes were very numerous in this region. Once I saw a fox with tail almost erect to keep it from getting wet skipping from rock to rock in the river trying to get at some Sheldrakes that were sitting on the water near the center of the stream.

I have no doubt but that skunks are the most destructive to birds that pass much of their time upon the ground. I am positive that red squirrels are destructive to small birds anywhere, especially to the eggs and young. But to get back to birds I will mention one feathered enemy, the Crow. On more than one occasion have I seen them carrying off young Robins from their nests close by an inhabited house, and have even shot the Crow with a young bird in his beak. I have had occasion to mention this before. (Vide "Recreation" Oct. 1898).

Mr. William Palmer of the U. S. National Museum has returned to Cuba to continue his investigations of the natural history of that Island.

An interesting and valuable collection of Northeast African birds has been recently received by the U. S. National Museum from Dr. A. Donaldson-Smith of Philadelphia, the well-known African explorer.

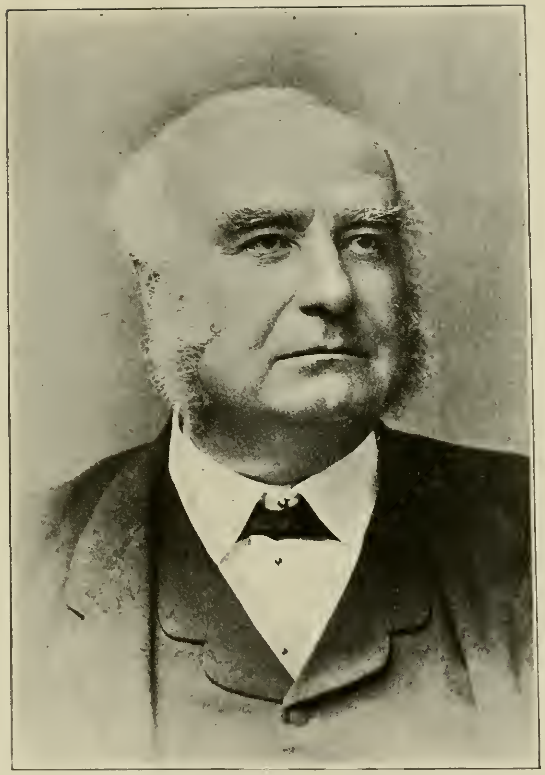
The Thrush is the name of a periodical published in London, but it is not in the interests of ornithology, but of poetry. It is proclaimed to be "the only periodical devoted exclusively to the publication of poetry by living writers".

PROFESSOR ALFRED NEWTON, F. R. S.

By Dr. R. W. Shufeldt.

At the present day there are in British Science many illustrious workers in the field of ornithology, and not a few of these have through their numerous published contributions to that ever fascinating subject become to be widely known in America. Among these no one holds a more prominent place, or has achieved a more far-reaching reputation, than Alfred Newton, Professor of zoology and comparative anatomy at Magdalene College, Cambridge, England. For a period extending over twenty years the writer has been so fortunate as to have been in pretty steady correspondence with this distinguished contributor to general ornithology in England, and it has been largely through his kind encouragement, able and just criticism, and friendly suggestion, that I have been enabled to accomplish what I have in several of the scientific fields wherein I have labored. When I have slipped, or, when from an insufficient knowledge of any particular matter about which I may have been writing, I have been found wanting in the presentation of facts, and these shortcomings have come under the eye of my generous friend, I was very sure to hear from him, and have the flaws in my subject-matter straightened out for me, and that with a candor and a generosity of spirit rarely found among men of science, who, as a rule, are not always noted for their charity when dealing with cases of this kind.

Of all of Professor Newton's many writings, perhaps none have caused him to be better known in this country than his ornithological contributions to the last edition (9th) of the Encyclopædia Britannica. The single article "Ornithology" thereto contributed is, of itself alone, one of the most classical and profound productions ever published dealing with the science of birds. Had this been his only work it would have gained him a reputation of the most enduring character, but there is not a volume of the twenty-four royal quartos, (not including the Index) which go to make up the set of the Encyclopædia Britannica which does not contain a score or more of Newton's ornithological articles, many of which are illustrated. When one comes to consider the thousands of book shelves, public and private, upon which a set of this great work occurs in the United States, it is not to be wondered at that Newton's name is probably as well-known with us, as it is among English readers. But there is more to be said on this point, for a few years ago, the author of all this gathered into one fine octavo work these various articles of the Encyclopædia and, through the publishing house, in London, of Adam and Charles Black, brought them out as his now well-known book entitled *A Dictionary of Birds*, which has earned for itself the place in chief in the libraries of



Professor Alfred Newton, F. R. S.

American ornithologists as the best working lexicon in the matter of bird-lore within the reach of the professional ornithologist.

In his earlier days Professor Newton was a great collector of the eggs of birds, a subject in which, at a very early time, he made himself a great authority. It is said that his private cabinets probably now contain one of the finest and most celebrated collections of the kind in Europe,—that is, one belonging to a private individual. It has been used, or will be used, by a distinguished British colleague in the science, Mr. Henry E. Dresser of London, who is engaged upon a great work devoted to the eggs of the birds of Europe, which, when it appears, will probably be the most substantial contribution to that subject in existence. It will contain a very large number of plates of eggs executed by the most modern methods in three-color photography.

It is many years ago since Professor Newton has visited the United States, and, due to advancing years, it is hardly to be hoped for that he will ever make the journey again, but should he through any fortune do so, he may be well-assured of a most cordial welcome to these shores. When here before, American ornithological science was, comparatively speaking, but a mere stripling; it has passed to maturity since those days, and I am sure we could interest even the most critical in ornithology with our extensive collections of birds, and birds' eggs, in the various museums and other institutions to be found in any of the large cities of the United States.

Professor Newton is a member of the Royal Society of England, the Zoological Society, and many other learned organizations in the various parts of the world. He is also an Honorary Member of the American Ornithologists' Union, having in 1883 been among the first placed upon that list.

Professor Newton was born at Geneva, Switzerland, on the eleventh day of June 1829, and was the fifth son of William Newton of Elveden (formerly Member of Parliament for Ipswich, and Lieut. Col. of West Suffolk Militia) and Eliza, a daughter of Richard Slater Milnes of Frayston, formerly Member of Parliament for York.

He entered Magdalene College, Cambridge, and graduated as B. A. in 1852, and was afterwards chosen Travelling Fellow of the College, in which capacity he visited Lapland, Iceland, the West Indies, North America and other countries.

In 1877 he was again elected a Fellow at Cambridge, having previously, in 1864, accompanied Mr. (now Sir) Edward Birkbeck to Spitzbergen. In 1868 he brought the subject of Bird Protection before the British Association with marked effect. It eventually led to his being several times elected chairman of the Close Committee, a duty which extended over several years, and during which time there were passed the first and third Acts of Bird Protection.

In his earlier researches, Professor Newton paid especial attention to the expiring faunæ of the Mascarene and Sandwich Islands which have been described by him in a number of papers. He has been one of the Vice-Presidents of the Royal Society, and a number of times of the Zoological Society. In 1900, the Linnæan Society of London awarded him its gold medal for his achievements in science, and he also received one of the Royal Medals of the Royal Society.

In addition to his being the author of *A Dictionary of Birds* and other books and memoirs already mentioned, he published in 1862 *Zoology of Ancient Europe*, and in 1863 *The Ornithology of Iceland* (Appendix to Mr. Baring-Gould's work on that Island). His best known works, apart from the Dictionary of Birds and the British Encyclopædia Articles on Ornithology, are *Oötheca Wolleyana*, (1864): "*Aves*" in the Record of Zoological Literature (Vol. i-vi); Zoology (1874; 2d Ed., 1894); *Birds of Greenland* (Arctic Manual, 1875); and his work on Yarrell's British Birds (4th Ed., Vol. i and ii, 1871-82). He was also editor of the *Ibis* from 1865 to 1870, and of *The Zoological Record* from 1870 to 1872.

Although Professor Newton is in his seventy-third year, he is still a worker in science, and there is probably no ornithologist in Europe that takes any keener interest in the progress of the science, and its present-day accomplishments and discoveries, than does the subject of the present brief biographical sketch.

REVIEWS.

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM, NO. 50. THE BIRDS OF NORTH AND MIDDLE AMERICA; Part I, Fringillidae.—The Finches. By Robert Ridgway. Washington, 1901 [actual date of publication, October 24]. 8vo, pp. xxxii + 716; pls. I-XX.

No one who has ever written a book, particularly one of scientific pretensions, can fail to appreciate in some measure at least the magnitude of the task Mr. Ridgway has set for himself, in attempting satisfactorily to describe all the 3000 species of birds in North and Middle America. For more than twenty years the author has been collecting material for this work upon which, since 1894, he has been steadily engaged, and of which the first part is just now published.

The area covered is the North American continent from the east end of the isthmus of Panama to the Arctic regions, including all its islands, together with Greenland, the Galapagos Archipelago, the West Indies and all other islands of the Carribbean Sea, leaving out Tobago and Trinidad.

The introductory portion of the present volume treats chiefly of the classification adopted for the whole work, which in the main follows that of Dr. Gadow, with such changes as, in Mr. Ridgway's opinion, are desirable. The class *Aves* is divided into two subclasses—*Saururae* and *Ornithurae;* and a key to the 19 orders of the latter is given.

Owing to the unsatisfactory arrangement of the collection of the National Museum, it was unfortunately necessary to begin systematic treatment with the highest instead of the lowest group; and consequently the order Passeriformes is the first to receive attention. It is here divided into two suborders —*Desmodactyli* and *Eleutherodactyli*, of which the former is extralimital, and the latter apportioned among three superfamilies—*Clamatores*, *Pseudoscines* and *Oscines*.

In the arrangement of the Oscines which present still the great problem of classification several changes are made. They are divided into two groups: the first, which includes the Alaudidae, is called here for the first time Latiplanter Oscines; the other, which comprises all the rest, Acutiplantar Oscines. Several family divisions are adopted in addition to those currently employed *i. e.:* Catamblyrhynchidae, Ptiliogonatidae, Dulidae, Sittidae, Chamaeidae and Mimidae; most of them, however, raised from subfamily rank. The much abused genus *Polioptila* is removed from the Sylviidae, to find a temporary resting place in the Mimidae; and *Rhodinocichla* is with reason transferred to the Mniotiltidae. A key to the American families of Oscines presents in graphic form their principal characteristics. No one more than Mr. Ridgway appreciates the difficulties surrounding the classification of this great group, and while his arrangement is probably quite the best that our present knowledge permits, yet he is undoubtedly right in suggesting that no wholly satisfactory arrangement can be hoped for until the anatomy of the various forms has been far more carefully and extensively investigated.

As the highest of the Oscine series, the Fringillidae are, in reverse order, the first to be treated, and fill the entire present volume except the introductory pages. Three hundred and eighty-nine forms are recognized, distributed among sixty-nine genera, introduced species as well as those indigenous being treated in their proper places. While leaving in abeyance the perplexing question of the satisfactory discrimination of the families Tanagridae and Fringillidae, the genera *Pyrrhocoma*, *Pezopetes*, *Buarremon*, *Arremon*, *Diucopis*, *Conothraupis*, *Oreothraupis* (?), *Saltator* and *Pitylus* are transferred to the latter. Abandoning the attempt to divide the Fringillidae into subfamilies, Mr. Ridgway, in lieu of this, proposes for the American genera of the present work the following groups, each containing from one to nineteen genera of comparatively close affinity:

Coccothrausteae.
Loxiae.
Pyrrhulae.
Fringillae.
Calcarieae.
Calamospizae.
Spizae.
Chondesteae.
Ammodrami.
Zonotrichiae.
Geospizae.
Haplospizae.
Sporophilae.
Cyanospizae.
Oryzoboreae.
Guiracae.
Cardinaleae.
Pityleae.

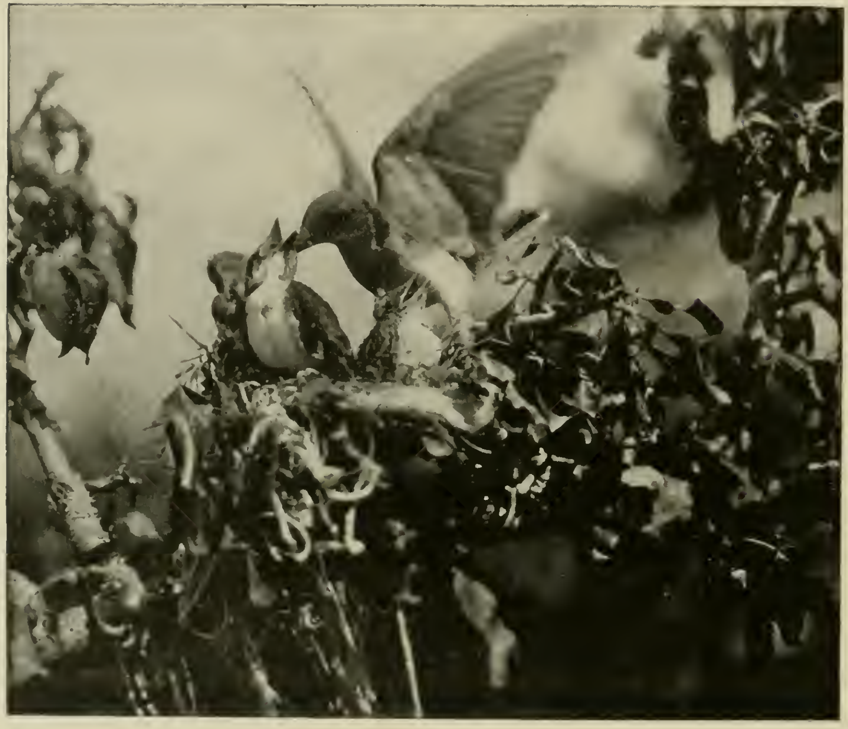
Prefaced by a good dichotomous key to the genera, each genus, species and subspecies is fully described, and in the case of the first including when necessary an elaborate key to the species, wherein are found not only adult males but females and young as well. Under each species there is given a full description of male, female and young, together with average measurements of both sexes—these, we are pleased to see, in millimeters. The diagnoses of subspecific forms are confined to salient characters, in order to save space, but full measurements are always added. The geographical distribution is with exceptional care delineated, and, whenever possible, the breeding range is indicated. The synonymy is very complete, though restricted to citations that possess a definite value, and has been compiled with an unusual regard for exactness that is refreshing, including when possible mention of the type locality and the location of the type specimen, besides the locality of all references except those from works of a general character.

Although most of the new forms brought to light through the preparation of this volume have been elsewhere published, we note at least three that appear for the first time here: *Geospiza harterti; Saltator magnoides medianus;* and *Carpodacus mexicanus sonoriensis.*

Mr. Ridgway's investigations have occasioned a great many changes in names of both species and genera, but his well known conversatism is warrant sufficient that these have not hastily or unnecessarily been made. In points of nomenclature he has been a strict adherent of the code of the American Ornithologists' Union, though of the rulings of its committee, in so far as they affect the status of forms, he has been entirely independent. We are sorry to see, however, in cases of manuscript names that the author of such name rather than the first describer is adopted as authority.

Upon the twenty plates with which this book is concluded there are illustrated in outline drawing the details of all the genera of Fringillidae treated in the pages that precede.

Taken all in all, there has for a great many years appeared no work on systematic ornithology that is deserving of so high praise as the first part of The Birds of North and Middle America, and it can not fail to add luster to a name that is already a household word among American ornithologists.—H. C. O.



Female Kingbird balancing herself with raised wings while feeding young. (From Herrick's "Home Life of Wild Birds" by courtesy of the publishers.)

The Home Life | of Wild Birds | A New Method of | the Study and | Photography of Birds | By | Francis Herrick | with 141 Original Illustrations from Nature | by the Author | G. P. Putnam's Sons | The Knickerbocker Press | New York and London | 1901. [Quarto pp. i-xx, 1-148, price $2.50]

The purpose of this handsome volume is so well defined in the preface that we will let the author speak for himself. "To describe and illustrate a new means of studying animal behavior, and to record what has been learned by its aid concerning the lives of some of our common birds is the main purpose of this volume. It is a popular study of birds in action and is chiefly concerned with the homes or nests and their occupants.

"While the desire has been present to make these pages readable, no effort has been spared to render them accurate. Many of the observations are new; nearly all are original, and every statement of fact is believed to be true as it stands.

"The wish to give a human interest to every phase of animal activity is of very ancient orgin, and has done too much already in spreading the seed of popular error and superstition concerning annimal life and lore. Animals should be studied as animals which they are, and not as human beings which they have never been, and are not likely ever to become.

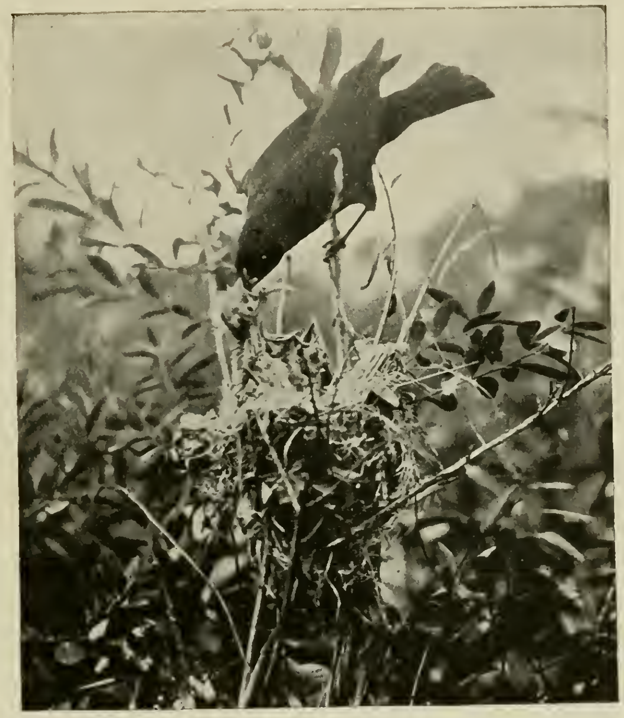
"The constant reading of human attributes into the activities of animals is to begin at the wrong end, and is a drag on the progress of accurate knowledge. We should first study the animal as far as possible from its own standpoint, and learn with exactness the facts of its life, taking care not to press analogies far farther than the observed facts will warrant. Ignorance of anatomy as well as of physiology, and the desire to find in the doings of animals a marvelous counterpart of human powers of intelligence and reason have already stocked our libraries with fables, anecdotes, and stories, many of which make delightful reading, but posesses little value for the modern student.

"The first duty of the narrator of natural as well as civil history is to tell the truth, and to the naturalists belongs also the privilege of showing that the lives of the higher animals, when fully and clearly revealed, possess a more vital interest than the puppet dressed in human clothes, however admirable the latter may be, as a work of art.

"I trust that the reader will not misunderstand these remarks. Is it denied that animals possess intelligence or any powers of reason? Not at all! Such questions depend largely upon our definitions of words, and without fresh observations are usually fruitless of result. What is criticized is the gross anthropomorphism which characterizes much that is written upon the actions of animals. If I am an offender in this direction, I hope it is only in a minor degree, I am anxious to attribute to the animal every power which it is actually known to possess, and look for the roots of human instinct and intelligence all along the line of animal evolution. It tends only to confusion, however, to call those acts of association which lead to acquired habits, instincts, or the countless mechanical or chemical reactions of organism to external stimuli, the expressions of intelligence and thought. 'Go to the ant thou sluggard!' is good advice, but one should bring from the ant a trustworthy account of how it performs its wonderful work. It is important to distinguish the root from the bud, as well as from the perfected flower and fruit.

"Nearly all the illustrations of this volume are from photographs of adult land birds, and the reader will observe that they are in many cases arranged in series, and portray certain actions which are performed in a kind of routine. With very few exceptions all were made by means of the method, that is to say, the photographs were taken deliberately and not by chance. My plan was to watch the life at the nest very closely, hour by hour, and day by day, and I often made a large number of photographs to illustrate typical and unusual scenes at a nest. The observer has the advantage of being on the spot, of being able to see every act performed, and to seize every opportunity which may arise. Many of the photographs here shown could not have been obtained by any other means".

Mr. Herrick has pursued his studies in a most novel and extremely successful manner. Disregarding all the old fancied notions, he has severed nesting boughs from their fellows, and carried them with their precious burden to a convenient open place, where abundant light could be obtained and undesirable shadows banished. There he has fastened them to a stake at a suitable distance from the ground, placed a small tent within easy range and thus screened he has spent hours, yes, days, watching the household affairs of birds, securing at the same time a series of photographs the like of which have never been produced. The notes are equally good. All in all we consider it by far the best book in this line which has been produced. We congratulate both author and the publishers. The cut of the Bluebird, Kingbird and Red-wing in this number are illustrations from the book reproduced by courtesy of the publishers.



Female Redwing Blackbird with feathers erect, keeping cool while shielding young from heat. (From Herrick's Home Life of Wild Birds by courtesy of the publishers.)

view and not a subjective one; in other words, to compare and contrast them bodily rather than with reference to their surroundings. Morphology, or the considerations of their structure, gives us a far better idea of their relations than physiology, or the consideration of their adaptation to their environment and condition of life. The former is necessary to fully understand the latter.

The full perception of this truth, however, was long delayed. Long after its essentials had been recognized, naturalists combined the Birds with Mammals in a group distinguished because both had warm blood and thus contrasted with other vertebrates which had cold blood. Here physiological adaptation was still given undue weight. The last great and vigorous upholder of this view was Prof. Richard Owen, who persisted in it until his death. The insufficiency and irrelevancy of the character in question became at length generally recognized in England, among scientific men, in the seventh decade of the past century. The appreciation of the close affinity of Birds and Reptiles was largely due to Thomes H. Huxley of England and Edward D. Cope of the United States.

One of the most striking differences between Birds and other animals is in the structure of the legs and the mode of combination of the tarsal bones. Instead of those bones being segregated in two rows, as in mammals, the rows are parted from each other, the proximal one uniting with the leg-bone and forming with it a tibio-tarsus, and the distal ones equally joined to the metatarsal segments and forming a tarso-metatarsus. This structure was found to be approximated in the mesozoic Dinosaurian reptiles and with this similarity other structures were seen to be coincident. In fine, the relationship of the Birds to Reptiles was demonstrated. Cope even went so far as to deny class value to the Birds, and to consider them as only a subclass of Sauropsida, a class including reptiles and birds, and several zoologists have followed him. It appears to be best, however, to recognize the Birds as a class, and as a class it will now be considered.

CHARACTERS OF THE CLASS.

The class, then, has its nearest relations in the Reptiles, but is distinguished by the sum of its characters. Birds, in short, are those vertebrates which have the hind limbs developed as legs, with the bones so partitioned that the proximal ones of the tarsus unites with the tibia to form a tibio-tarsus and the distal ones with the metatarsus to constitute a tarso-metatarsus, (the ankle joint thus being interposed between the tarsal rows,) the fore limbs modified as wings, the body more or less covered with feathers, the jaw bones extended into a beak and covered with a specialized horny sheath in two or more pieces, the heart quadrilocular, the circulation complete, the blood warm, and reproduction oviparous, the egg being laid with a hard shell.

These characters could be indefinitely supplemented by adding such as would serve to contrast with the Mammals, the Amphibians, the Fishes, and other classes of vertebrates, but for our present uses those given suffice for all practical purposes. By themselves, however, most of them are of comparatively little taxonomic value. Some of the Dinosaurian reptiles had hind feet nearly like those of birds and triassic representatives of the order left, on the shores that became the red sandstone of the Connecticut valley, numerous imprints that were long supposed to be those of the feet of birds; the transformation into wings of the fore-limbs is no greater a deviation from a normal limb than is the one, equally adapted to flying, of a Pterodactyl reptile or that, modified as a flipper for swimming, of an Ichthyosaurian reptile; the feathery covering of a bird is not more remarkable or a more extreme modification of the integumental investiture than is the shell of a chelonian reptile (tortoise); most tortoises, too, have horny sheaths capping the jaw bones; the variations in the structure of the heart and the circulatory apparatus of reptiles are so great that little strain on taxonomy would be exercised in admitting the avian modification within the limits of the class, and it is quite possible that Pterodactyls may have had a complete circulation and warm blood and not impossible even that some at least of the Dinosaurians had; the Crocodilians even of the present day approach such a structure.

It is therefore, we repeat, not by any one character but the aggregate of characters that the group of birds is separated from the reptiles and that group is so natural and so well represented by numbers that convenience is subserved by its differentiation as a class. Furthermore, the principal forms of each class are antitypical to each other. The cold-blooded and creeping reptile is generally regarded as the very opposite of the quick-blooded and soaring bird. In the present age of the earth the two contrast rather than compare and so we represent them in our classification.

The Birds contrast with the reptiles not only in their physiological characteristics but in their homogeneity. That homogeneity is indeed wonderful and the class thereby contrasts not only with the reptiles but with every class of vertebrates. Allusion has been made to the variation among the reptiles; in the class of mammals there are forms adapted for a flight as vigorous as that of most birds (Bats) and others which swim in the seas as well as fishes (Cetaceans) Among the fishes we find even still greater variation; there are, for instance, forms higher than long and there are others more slender than a whip-lash. The Amphibians, the Selachians and the Marsipobranchs manifest little less if any less morphological variation than those specified. In contrast with such, the uniformity existing within the class of Birds is great indeed, What is true of one, in general terms, is true of all. The species, numerous as they are, differ chiefly in matter of detail.

THE GENERAL CHARACTERS OF BIRDS.

Every bird has an ovoid trunk, developing forwards a more or less elongated neck terminating in a well differentiated head. This head has lateral eyes, sometimes inclining forwards, and its jaws, generally abruptly differentiated from the rest of the head, are covered with horny pieces, constituting what is called a bill or beak, and this is the most variable hard part, externally, in the class; the nostrils are two and symmetrical, but vary in position and development, and are sometimes (rarely) almost entirely obliterated. There are no external ears or ear-conchs.

The legs are essentially similar in all the members of the class but their mode of insertion and the length of the femora entail variations in the pose and carriage of the trunk; this is generally oblique, but in some (as the duck) it is nearly horizontal or even droops forwards while in others (as the auks and penguins) it is almost or quite vertical. The femora are completely enveloped within the musculature and integument; the tibiæ in most birds are more or less hidden proximally but in the long-legged forms they are almost completely exserted, the musculature reduced to a minimum, and the distal ends covered with scutella. The heel joint is between the proximal and distal rows of carpal bones which, as already indicated, are coalesced with the adjoining long bones; as a rule the heel is upraised and the tarsi (tarso-metatarsi) carried at more or less of an angle from the ground; the toes radiate from the tarso-metatarsi and are usually four in number, three directed forwards and one backwards, but there are numerous and various deviations from this form and in one type (the ostriches) there are only two toes; the toes generally have a characteristic number of joints, a tridactylous or tetradactylous foot having three joints or phalanges in the inside toe, four in the middle, and five in the outside, but there are a number of exceptions, as in the typical swifts, some kingfishers, the typical goatsuckers and various others.

The contrast between the constancy in the number of toe joints, and the irrelevancy or want of co-ordination of the deviations, in the types mentioned, with other characters is remarkable. The deviations are unaccompanied by other modifications of structure to such an extent that they are of little, if any, more than generic importance.

The tarsi and the toes are almost always covered with scutella or scales of some kind or other. The toes are terminated by claws which vary in shape and function.

The wings vary greatly in development. In almost all species they are extended sufficiently for flight but there are various species, which are nearly related to swift-flying birds, that have lost the power of flight, such as the extinct great auk and the adult steamer duck of South America; others have not only lost that power, but the wings have further degenerated, as in the ostriches and related forms, and in some extinct forms (Dinornithids) they had entirely disappeared. The osseous frame work will be considered in a later chapter.

The entire body is invested in a coat of feathers whose chief modifications deserve a more detailed notice.

THE PLUMAGE OF BIRDS.*

The plumage of birds is clearly their distinctive character; the absence of teeth is a character of turtles also, and other animals have horny beaks; the possession of wings is not confined to birds, and the various skeletal characters of the class are to a large extent shared with reptiles. But feathers are unique, and any animal covered with feathers is clearly a bird, while any animal normally lacking them is just as certainly something else. And yet it must be understood that there is a very great variety of structure in feathers, not only in those from different birds, but in those from different parts of the same bird. Moreover there is nearly as wide a range of difference between the plumage of a Penguin and that of an Apteryx as there is between scales and hair. The differences in texture of plumage are generally associated with habit, the long-legged land birds, especially those with reduced wings, having a loose, more or less hair-like plumage, which reaches its extreme in the Apteryx; while most water birds, especially those with short wings and legs, have a very compact plumage, which reaches its extreme in the Penguins. But these differences in texture of plumage are dependent upon three factors, (1) the development of muscle in the skin which control the movements of the feathers, (2) the kinds of feathers, and (3) the arrangement of the feathers. Of the first factor little need be said further than to state the fact that many feathers are provided with subcutaneous muscles, sometimes several to each feather, by which the feathers can be independently moved. The development of this subcutaneous muscle-layer varies much in different groups of birds, but is generally particularly well-marked in those with a very compact plumage.

THE FEATHERS OF BIRDS.

There are five quite distinct groups into which feathers can be divided, but intermediate forms constantly occur so that the distinctions are somewhat arbitrary. First and most important of all are the *contour-feathers*, so-called because they are the ones which give the form or contour to the body. They are the largest and most fully developed of feathers, and the other kinds may be regarded, perhaps, as modified or degenerate contour-feathers. Whether this means that they were the original primitive form of feathers is another question, and one to which we still need an answer. Embryology might lead us to believe that contour-feathers are modified from some other kind, but there can be no question about the most unique of known birds, *Archaeopteryx*, having possessed true and well-developed contour-feathers. A contour-feather consists of at least three, sometimes four, parts—the *quill*, the *shaft*, and the *vanes*, and frequently the *aftershaft*. The quill is a short, more or less empty, horny tube, generally cylindrical but tapering at each end. At the end, imbedded in the skin, there is a minute opening through which, when the feather was young and growing, blood-vessels passed; but in fully-formed feathers there are no such vessels. It is to the lower end of the quill that the above-mentioned subcutaneous muscles are attached. At its outer end the quill passes uninterruptedly into the shaft, which is solid, opaque, and generally squarish in cross-section. It is often very much flattened, and forms a prominent part of some scale-like feathers. In other cases it is greatly elongated and becomes filamentous. The vanes are placed on opposite sides of the shaft and are made up of narrow plates called *barbs*, which are attached by the broader end to the shaft. They are placed so that the narrow edge is visible while the broad side is generally concealed by the corresponding surfaces of adjoining barbs. The angle which the barb makes with the shaft is usually less than a right angle, and is least nearest the tip of the feathers. The barbs of a contour-feather, except at the base of the shaft, are connected with each other by smaller barbs of the second order known as *barbules*, which stand at an oblique angle to the barb, and on both sides of it, in the same relative position as the barbs and shaft. These barbules taper rapidly to a fine point, but are flattened laterally, and are long enough to cross several barbs obliquely. They thus make the vane, a true net-work or *web* as it is sometimes called, and hold the barbs together with considerable firmness. In many feathers, the lower edge of the barbules is fringed with little hooks, which are called *barbicels*, and which assist very much in holding the vane together. Feathers in which the shaft is stiff, and nearly the whole vane closely webbed by barbules and barbicels, are called *pennaceous*, while those in which the shaft is more flexible, and the barbs not united, are generally known as *plumulaceous*. Most contour-feathers are plumulaceous at the base for a greater or less distance. Strictly pennaceous feathers never have an aftershaft, but the other contour-feathers of the vast majority of birds have one, more or less well-developed. It is interesting to note that aftershafts are wanting in Ostriches, Rheas, Albatrosses, the Steganopodes and Lamellirostres (with few exceptions), Pigeons, American Vultures, Owls, Cuckoos, Kingfishers and the Osprey. An aftershaft is a more or less well-developed shaft with vanes arising from the base of the true shaft close to the quill, and on the lower side. In Cassowaries it is very large, nearly if not quite equal in size to the main shaft, and very similar to it in appearance, while the other extreme is represented by the More-pork (*Podargus*) where the aftershaft is reduced to a mere horny scale without barbs. In Grouse and Quail it is very well-developed, while in song birds it is very small. Aftershafts are never pennaceous, and the barbs are usually separate, except sometimes close to the shaft.

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*All that relates to the plumage of birds and their feathers (pp. 8-14) has been contributed by Dr. Hubert Lyman Clark, Professor of Biology in Olivet College, Michigan.

The second kind of feathers is generally spoken of as *down*, and down-feathers form an important, though usually concealed, part of the plumage. Down-feathers possess a short quill, but the shaft may be wanting, and is never conspicuous, while the vanes are not recognizable as such, but consist of entirely independent, more or less filamentous barbs. An aftershaft may be present, but it is very similar to the mainshaft. Where no shaft is present, the barbs spring in a tuft from the end of the quill which is so short that the tuft of down is apparently nearly sessile. Down-feathers form a large part, if not all, of the first plumage of most birds, and each contour-feather is preceded by a down-feather. Between down-feathers and contour-feathers nearly all stages of intergradation occur, and many of these intermediate feathers are distinct enough from either to form a new group known as *half-down* or *semi-plumes*. Like down, the half-down is concealed by the contour-feathers, but like the latter, it always has a well developed shaft and is more or less pennaceous near the tip. The fourth group of feathers is made up of those which are called *filoplumes*. These have the shaft very slender and elongated, and either lack vanes entirely or have them represented by a very small tuft of barbs at the tip of the shaft. They never have an after-shaft. The last group includes a peculiar type of down, which is constantly growing and breaking off at the tips, thus giving rise to a peculiar greasy powder, the use of which is still open to question. Such feathers are called *pulviplumes*, and they are least common of any of the five groups.

THE ARRANGEMENT OF FEATHERS.

The above-mentioned kinds of feathers compose the plumage of birds; very few birds possess the five sorts. *Pulviplumes* are found only in a very few cases, except among Herons, where they are specially well-developed. In the Herons, and in most other cases where they occur at all, they are found in special dense patches known as the *powder-down tracts*. The number of these tracts varies in different species of Heron from 2 to 8. In a few birds, the pulviplumes occur scattered among the contour-feathers, sometimes in considerable numbers. *Filoplumes* occur in practically all birds and generally accompany the contour-feathers. Usually there is one filoplume close to each contour-feather, at least on the neck and rump, and generally on other parts of the body. Sometimes 2, rarely 6, 8 or 10, filoplumes accompany each contour-feather. *Down-feathers* occur on any or all parts of the body. Generally they are either confined to areas free from contour-feathers, or wanting these and mixed with the contour-feathers, but in many water birds a dense coat of down completely covers the body. Among contour-feathers, down-feathers are arranged frequently in a quincunx in the space marked out by four contour-feathers. *Semiplumes* occur associated with the contour-feathers, generally, but are often mixed with down. They may be found on any part of the body.

The *contour-feathers* rarely occur uniformly scattered over the body. Such an arrangement, however, is found in the Penguins. Among the Ostriches and their allies, the feathers, though not true contour-feathers, are uniformly distributed over the body in the adult. In the Ostriches, however, the young bird has the feathers confined to definite spaces, so that in that case the uniform covering would seem not to be the primitive condition. In nearly all other birds, contour-feathers occur only on definitely limited portions of the body, which are therefore called the *feather tracts* or *pterylae;* the spaces between the tracts, which are free from contour-feathers, are called *apteria.* Besides the tracts which cross the head, and those which include the wings and tail, the principal tracts are as follows: the *upper cervical* tract, the *dorsal*, the *humeral*, the *femoral*, the *tibial*, the *lower cervical*, the *sternals*, and the *ventrals.* Rarely, we find instead of upper and lower cervicals, two *lateral cervicals.* Any of these tracts may be wanting, but the positions of those present are sufficiently indicated by their names. In size, width, form and density, there is the greatest possible variety, birds of different orders showing marked differences in all these matters. For this reason, the arrangement of the tracts is a matter of great importance in classification, and is technically known as the *pterylosis* of the bird and the study of pterylosis is called *pterylography.* By many writers it has been assumed that the pterylosis is determined by the habits and body-form of the bird, and is consequently an adaptive and easily modified character, but there is much evidence to the contrary, and it is entirely possible that the fundamental plan of the pterylosis is one of the most deep-seated and least modifiable of the morphological characters of birds. It must be admitted that our knowledge of the pterylography of birds is far too imperfect for us to make positive statements as to the value of characters furnished by pterylosis.

The largest feathers are generally borne on the posterior ends of the tracts, and this is especially true of those which include the wings and tail. In these tracts are included those feathers which are of such importance to the bird in flight, the *remiges* (rowing-feathers) and the *rectrices* (steering-feathers), together with their *coverts.* The *remiges* are borne on the posterior upperside of the hand and arm, and are grouped under 3 heads, according to their location. Those borne on the hand are called *primaries;* those on the fore-arm, *secondaries;* and those above the elbow, *tertiaries.* The primaries are remarkably constant in number, the great majority of birds having 10; some birds have an additional very small outer primary, but no living bird has more that 11; many of the higher passerine birds have the tenth or outermost primary very small, and in the Finches, Swallows, American Warblers and several other families, only 9 primaries occur. The relative length of the primaries, and the width and texture of the vanes, are useful characters in separating genera and species. The secondaries are shorter than the primaries and their number is much more variable; the smaller Swifts and Humming Bird have only 6, while Albatrosses have 40 or more. The tertiaries are seldom noticeably developed, and are of little importance. The coverts of the remiges are called the *upper* and *under wing coverts*, according to their position, and are also sub-divided as *major* and *minor* coverts according to their size and importance. The under wing-coverts, near the sides of the body, are often conspicuous for their size and color, and are known as *axillaries.* They are especially notable in Snipes and Plovers. The small group of feathers borne on the thumb is called the *alula;* the number of feathers in it ranging from 2 to 6. The rectrices are borne on the compound ''ploughshare-bone'', or *pygostyle*, which terminates the vertebral column. Their number is variable, though the great majority of birds have 12. The Anis have only 8, Cuckoos, Humming Birds and many others have 10, while many game birds have from 14 to 22, and some water-birds even more than that; the Penguins have 32 or more. The relative lengths of the rectrices and their individual and collective form are important characters. The coverts, known as *upper* and *under tail coverts*, are sometimes longer than the rectrices, and one or more pairs may assume the function of the latter.

Many birds have special crests, knots, tufts, or groups of feathers, which are notable either for their greater size, or more conspicuous coloring. Such groups usually form special tracts in the pterylosis, and are almost invariably composed of highly specialized contour-feathers. They may be a permanent part of the plumage, or only assumed during the breeding season, and they are usually much more noticeable in the males. Indeed, they are often wholly wanting in the females, as the plumage of the weaker sex is, in the majority of birds, much plainer than that of the males. These specialized groups of feathers are generally found on the top or back of the head, on the shoulders, or on the rump, but they may appear on any part of the body. The upper tail coverts, the upper wing coverts, and the occipital contour-feathers are the ones most often concerned. Marked differences in the appearance of the plumage may be caused not only by these special groups of feathers, but also by the absence of feathers on certain parts of the bird where they are

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